

REMARKS

The claims have been revised better to point out that which applicants regard as their invention. The requested drawing and specification changes have been made as well.

Claims 1 to 7 have been canceled, claim 8 has been amended, and new claims 9 to 20 have been added. Thus, the claims before the Examiner for consideration are claims 8 to 20. Claims 8 to 11 are method claims while claims 12 to 20 are cleaning system claims based upon the subject matter of claims 8 to 11.

The claims before the Examiner are based upon methods and cleaning systems for cleaning a rectangular substrate that is shown and described in both Fig. 2A and 2B; see the related discussion in the specification at page 7, line 27 to page 8, line 16. As indicated above, new claims 12 to 20 are directed to a system for carrying out the methods of claims 8 to 11.

The rejection of claims 1 to 8 under 35 USC 103 as unpatentable over Yashiki et al. '465 in view of Stephens et al. '507, if applied to the claims as amended, is respectfully traversed. As indicated above, the cleaning apparatus claims 1 to 7 have been canceled.

Claims 8 to 20 are directed to methods and techniques for cleaning a rectangular substrate and the claims elements or

steps that conform to the operations depicted in Figs. 2A and 2B. Such a system or related method is not taught or suggested in the cited references.

Amended claims 8, 10 and 12 are characterized by the following features:

(1) at least a pair of cleaning apparatuses (9a, 9b; 9c, 9d; 9) are placed on the opposite sides of a direction of relative movement of the rectangular substrate (1);

(2) each of the cleaning apparatuses (9a, 9b; 9c, 9d; 9) includes an upper cleaning roller (16) and a lower cleaning roller (17), which hold the respective opposite peripheral parts extending along the opposite edges of the rectangular substrate (1);

(3) the opposite peripheral parts of the rectangular substrate (1) are cleaned by the cleaning apparatuses (9a, 9b; 9c, 9d; 9) by the steps of: supplying a cleaning liquid to at least either the elastic porous member (29) of the upper cleaning roller (16) or the elastic porous member (30) of the lower cleaning roller (17) of the respective cleaning apparatuses (9a, 9b; 9c, 9d; 9); and rotating the upper and lower cleaning rollers (16, 17) of the respective cleaning apparatuses (9a, 9b; 9c, 9d; 9), while moving the respective upper and lower cleaning rollers (16, 17) relative to the

rectangular substrate (1) along the direction of relative movement of the rectangular substrate (1); and

(4) the rectangular substrate (1) is turned in a plane thereof through an angle of 90° so that second opposite edges of the rectangular substrate (1) are placed at the respective cleaning apparatuses (9a, 9b; 9c, 9d; 9) to clean the second opposite peripheral parts extending along the second opposite edges of the rectangular substrate (1), after the first opposite peripheral parts of the rectangular substrate (1) are cleaned by the respective cleaning apparatuses (9a, 9b; 9c, 9d; 9).

More specifically, amended claims 8 and 12 call for two pairs of cleaning apparatuses, i.e., a pair of first cleaning apparatuses (9a, 9b) and a pair of second cleaning apparatuses (9c, 9d) as shown in Fig. 2A. The first cleaning apparatuses (9a, 9b) are placed at an interval corresponding to a distance between first opposite edges of the rectangular substrate (1), and the second cleaning apparatuses (9c, 9d) are placed at an interval corresponding to a distance between second opposite edges of the rectangular substrate (1). Under this arrangement, the first opposite peripheral parts and the second opposite peripheral parts of the rectangular substrate (1) are successively cleaned by the first cleaning apparatuses

(9a, 9b) and the second cleaning apparatuses (9c, 9d), while turning the rectangular substrate (1) in a plane thereof through an angle of 90°.

On the other hand, in the case of amended claims 10 and 12, only a pair of cleaning apparatuses (9a, 9b) as shown in Fig. 2B are provided. The cleaning apparatuses (9a, 9b) are firstly placed at an interval corresponding to a distance between first opposite edges of the rectangular substrate (1). Under this arrangement, the first opposite peripheral parts and the second opposite peripheral parts of the rectangular substrate (1) are successively cleaned by the cleaning apparatuses (9a, 9b), while turning the rectangular substrate (1) in a plane thereof through an angle of 90°, and adjusting a distance between the cleaning apparatuses (9a, 9b) in accordance with a distance between the second opposite edges of the rectangular substrate (1).

By the present invention, the four peripheral parts extending along the four edges of the rectangular substrate (1) are cleaned by at least a pair of cleaning apparatuses (9a, 9b; 9c, 9d; 9), which are placed on the opposite sides of a direction of relative movement of the rectangular substrate (1). In cleaning the peripheral parts of the rectangular substrate (1) by the cleaning apparatuses (9a, 9b; 9c, 9d; 9),

the first opposite peripheral parts and the second opposite peripheral parts of the rectangular substrate (1) are successively cleaned by the first cleaning apparatuses (9a, 9b; 9c, 9d; 9), while turning the rectangular substrate (1) in a plane thereof through an angle of 90°. Therefore, the peripheral parts of the rectangular substrate (1) can be cleaned effectively in a short time with simple arrangements of the cleaning apparatuses.

Yashiki et al. '465 discloses a cleaning apparatus having an upper rod shaped brush (3-1) and a lower rod shaped brush (3-2) for holding a peripheral part of a workpiece (W). A review of the reference shows that the workpiece (W) in Yashiki et al. '465 is a circular magnetic disk and the cleaning apparatus of the reference simply cleans the workpiece by rotating it about a center axis L in a plane thereof with the outer periphery of the workpiece held between the upper and lower rod shaped brushes of the cleaning apparatus. Stephens et al. '507 is cited to show that porous brushes to which a cleaning fluid is supplied are known in cleaning apparatuses. The reference, however, does not overcome the deficiencies of the primary reference as applied to the claims as revised. The references in combination lack any teaching or suggestion of the cleaning method or system of

Serial No. 09/937,616

the claims before the Examiner. The rejection should be withdrawn.

The Examiner is thanked for acknowledging that a certified copy of the priority document has been received and for listing the references indicated in an Information Disclosure Statement.


In view of the foregoing revisions and remarks, it is respectfully submitted that claims 8 to 20 are in condition for allowance and a USPTO paper to those ends is earnestly solicited. The Examiner is asked to contact the undersigned should anything further be required in this case.

Respectfully submitted,

PARKHURST & WENDEL, L.L.P.


Charles A. Wendel

Registration No. 24,453


Date

CAW/ch
Attorney Docket No.: DAIN:649

PARKHURST & WENDEL, L.L.P.
1421 Prince Street
Suite 210
Alexandria, Virginia 22314-2805
Telephone: (703) 739-0220